

**REMARKS:**

Claim 25 has been amended herein. Claims 2, 6, and 25-32 remain pending in the above-identified application.

Claims 2, 6, 25, 26, and 29-31

Applicant respectfully requests reconsideration of the rejection of claims 2, 6, 25, 26, and 29-31 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,330,967 ("Milewski") in view of U.S. Patent No. 5,878,943 ("Nishikawa"). Each of claims 2, 6, 25, 26, and 29-31 recites solder bumps formed on the semiconductor chip, **a resin film disposed on the semiconductor chip and *directly contacting* the solder bumps** such that **upper surfaces of the solder bumps protrude from the resin layer**, a eutectic solder layer disposed on the cleaned upper surfaces of the solder bumps, **a plurality of lands formed on the mounting board**, and **a precoated solder layer disposed on the lands**, wherein the eutectic solder layer of the solder bumps and the precoated solder layer join the upper surfaces of the solder bumps to the lands of the mounting board.

Milewski discloses a process for connecting a circuit card 21 to an IC chip 10. Nishikawa discloses a method for removing an oxide or contaminated layer from the surface of a solder material or bonding pad. Milewski and Nishikawa, taken alone or in combination, do not disclose disposing a resin film on the semiconductor chip and *directly contacting* the solder bumps or a plurality of lands *formed on* the mounting board, as claimed. Specifically, Milewski does not show or suggest disposing a resin film *directly* contacting the solder bumps. Even if the passivation layer 14 of Milewski is considered a resin film, the layer is not "directly contacting (the) solder bumps," as claimed. Instead, the passivation layer 14 directly contacts a ball limiting metallurgy (BLM) (see Fig. 3 and column 2, lines 58-67). Because the Office action does not show "a resin film disposed...directly contacting (the) solder bumps," a *prima facie* case of obviousness has not been made.

Further, Milewski fails to show or suggest a resin film disposed on the semiconductor chip and directly contacting the solder bumps *such that upper surfaces of the solder bumps protrude from the resin layer*. Figs. 4, 5A, 5B, and 6 of Milewski fail to show upper surfaces of the ball 35 protruding from a resin layer, partly because no resin layer is shown for the devices shown therein. Fig. 3 of Milewski shows a prior art device wherein a solder bump 30 protrudes from a BLM 15, 16, but does not show or suggest having a resin film directly

contacting the solder bumps such that upper surfaces of the solder bumps protrude from the resin layer.

Yet further, although Milewski discloses a tin cap 37 and a layer 14, these elements are not described with respect to the same device. Particularly, the tin cap 37 is part of the device shown in Fig. 4 and the layer 14 is part of the prior art device shown in Fig. 3. The devices have other distinctions as well. For example, in the prior art device, the solder bump 30 is connected to the chip 10 by way of a BLM 15, 16, a contact 12, and leads 13, but in the device of Fig. 4, the solder ball 35 is connected to the chip 10 by lead 13 and I/O terminal 15. Milewski does not suggest implementing relevant qualities (including the tin cap 37 and layer 14) of the devices together. The Office action, at page 7, lines 5-8, asserts that it would have been obvious to incorporate the qualities of the device in Fig. 3 into the device of Fig. 4 because, "Fig. 4...is based on the structure in Fig. 3 Prior art." However, Milewski gives no indication that the Fig. 4 structure is based on the prior art, outside of being an improvement thereof (e.g., see column 3, lines 1-6). On the contrary, Milewski's description of the devices as separate and the Fig. 4 device as an improvement on the prior art device lends toward the conclusion that only the qualities described or suggested as being common to the devices are in fact common to them.

Still further, the references fail to show or suggest the eutectic solder layer of the solder bumps and the precoated solder layer join the upper surfaces of the solder bumps to the lands of the mounting board. Fig. 5 of Milewski shows an embodiment wherein the ball 35 is joined to the pad 51 by way of eutectic 39. Because the eutectic 39 is formed through the interaction of the cap 37 and ball 35 (e.g., see column 5, lines 25-27), the joint is not a result of a eutectic solder layer of the solder bump joining with a precoated solder layer, as claimed. Fig. 6 of Milewski shows an embodiment wherein the ball 35 is joined to the pad 51 by way of layer 48. In this embodiment, the layer 48 is used to join the ball to the pad "instead" of using a cap 37 (see column 5, line 64 to column 6, line 1). Thus, the embodiment of Fig. 6 also fails to show or suggest the eutectic solder layer of the solder bumps and the precoated solder layer join the upper surfaces of the solder bumps to the lands of the mounting board.

Yet still further, the references also fail to show or suggest "a plurality of lands formed on the mounting board" and "a precoated solder layer disposed on (the) lands" The Office action asserts that the lands are represented by reference 53 and the pre-coated solder layers are represented by reference 51. However, the "lands" 53 of Milewski are not

lands, as claimed, but simply locations on the circuit card 21. These locations 53 on the circuit card are not "formed on" the mounting board, as claimed. Further, the pads 51 of Milewski are not precoated solder layers. To the contrary, the pads 53 are "substantially free of...solder" (e.g., see column 4, line 47 - column 5, line 3). Because the Office action does not show "a plurality of lands formed on the mounting board," a *prima facie* case of obviousness has not been made. See M.P.E.P. § 2143.03.

In addition, Milewski *teaches away* from implementing a precoated land and a coated solder ball together, as the express purpose of Milewski is to obviate the need for both. Milewski clearly states the "pads 51 are substantially free of deposited solder alloy" and a coated solder ball is implemented *in lieu of* a coated pad. (column 4, line 47 - column 5, line 5). Substantiating Milewski's teaching away from using a pre-coated pad and a coated solder ball, together, another embodiment of the reference (shown in Fig. 6) discloses a coated land for use "*instead*" of a coated solder ball (see column 5, line 64 - column 6, line 1 (emphasis added)). Still another example of Milewski teaching away from using both a coated pad and a coated solder ball is at column 5, lines 37-40, which states, "[t]he SN-rich cap 37 serves as the Sn supply for eutectic formation, *thereby obviating the need for a Pb/Sn electroplate on the pads.*" (emphasis added). Thus, Milewski at least thrice clearly states that a coated solder ball *or* a coated pad can be used, but not both. Milewski purposely obviates the need for both a coated solder ball and a coated pad, and thus teaches away from such use. Because Milewski teaches away from the use of a coated pad and a coated solder ball together, it is not reasonable to combine Milewski's teaching of a coated pad and a coated solder ball. See M.P.E.P. § 2141.02, stating, "(a) prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention." (emphasis in original). The Office action, at page 7, lines 17-21, asserts that Milewski shows using a pre-coated pad and a coated solder ball together "through disclosing a process of connecting the solder ball with a eutectic solder layer...to the land/pad precoated with an oxidation inhibitor...or Pb/Sn electroplated" and citing column 5, lines 1-5 and 39-41 of Milewski. However, as stated above, these sections of Milewski disclose, respectively, a pad 51 that is "substantially free of...solder" and may instead be a surface including an oxidation inhibitor and the non-presence of a Pb/Sn electroplate on the pads.

Further regarding claim 26, Milewski fails to show or suggest the eutectic solder layer of the solder bumps and the precoated solder layer intermix to join the upper surfaces of said solder bumps to the lands of said mounting board.

Further regarding claim 30, Milewski fails to show or suggest each land having a top side, a bottom side opposite the top side and directly contacting the mounting board, and side walls extending from the top side to the bottom side. The Office action, at page 4, lines 6-8, asserts that Milewski shows these features. However, the "lands" 53 of Milewski are simply a location on the circuit card 21, at certain locations on a top surface thereof. The lands 53 of Milewski are non-dimensional and do not have bottoms or sides. On the other hand, the lands of the present claim are clearly three-dimensional structures.

Further regarding claim 31, Milewski does not show or suggest the mounting board including an upper surface wherein the upper surface has land portions on which the lands are formed. The Office action asserts that the "lands" 53 (of Milewski) on the upper surface of the circuit card 21 are the lands of the present invention. However, the present claim recites that the mounting board has an upper surface having land portions on which the lands are formed. The "lands" 53 of Milewski cannot be formed on land portions of an upper surface because the "lands" 53 are themselves portions on the upper surface. And if the "lands" 53 of Milewski are considered the "land portions" of the present invention, which is the natural interpretation of Milewski, then pad 51 would correspond with the "land" of the claims. However, under this natural interpretation, there is still no precoated solder layer disposed on the lands, as claimed.

Because the reference fails to show or suggest all of the features of claims 2, 6, 25, 26, and 29-31 and the primary reference teaches away from the claimed invention, the rejection is improper. Accordingly, Applicant respectfully requests the rejection of these claims be withdrawn.

#### Claim 27

Applicant respectfully requests reconsideration of the rejection of claim 27 under 35 U.S.C. § 103(a) as being unpatentable over Milewski in view of Nishikawa and further in view of U.S. Patent No. 3,811,183 (Celling). Because claim 27 depends from claim 25, claim 27 is allowable for at least the same reasons identified above with respect to claim 25.

Claim 28

Applicant respectfully requests reconsideration of the rejection of claim 28 under 35 U.S.C. § 103(a) as being unpatentable over Milewski in view of Nishikawa and further in view of U.S. Patent No. 6,168,972 (Wang). Because claim 28 depends from claim 25, claim 28 is allowable for at least the same reasons identified above with respect to claim 25. Further, Wang does not qualify as prior art under Section 102. One of Applicant's foreign priority applications, Japanese Application No. P10-247393, filed on September 1, 1998, predates the effective priority date of Wang.

Claim 32

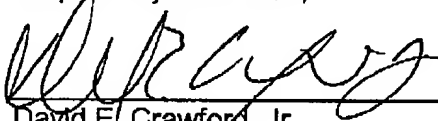
Applicant respectfully requests reconsideration of the rejection of claim 32 under 35 U.S.C. § 103(a) as being unpatentable over Milewski in view of Nishikawa and further in view of U.S. Patent No. 6,469,393 (Oya). As an initial matter, the rejection is improper because claim 32 depends from claims 25 and 31, which were improperly rejected as shown above. Further, Oya does not qualify as prior art under Section 102. One of Applicant's foreign priority applications, Japanese Application No. P10-247393, filed on September 1, 1998, predates the effective priority date of Oya.

Conclusion

As it is believed that the application is in condition for allowance, a favorable action and Notice of Allowance are respectfully requested.

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Respectfully submitted,



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